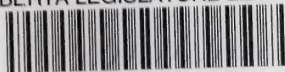


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POWER

COMMISSION



"SWAN HILLS PIPELINE CONSTRUCTION" - Courtesy Home Oil Co. Ltd.

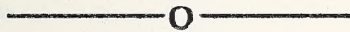
1958

ANNUAL REPORT



GOVERNMENT OF THE PROVINCE OF ALBERTA

The Honorable A. McCreary,
Minister of Industries and Labour,
Administration Building,
Edmonton, Alberta.



ANNUAL REPORT

OF THE

ALBERTA POWER COMMISSION

FOR THE YEAR ENDING

DECEMBER 31, 1958

EDMONTON



J. G. MacGREGOR

CHAIRMAN



GOVERNMENT OF THE PROVINCE OF ALBERTA

ANNUAL REPORT

ALBERTA POWER COMMISSION

FOR THE YEAR ENDING
DECEMBER 31, 1953

EDMONTON

PRINTED BY THE GOVERNMENT OF ALBERTA

1954

January 31st, 1959

The Honorable R. Reiersen,
Minister of Industries and Labour,
Administration Building,
Edmonton, Alberta.

Sir:

I have the honor to submit herewith the Annual Report
of the Alberta Power Commission for the calendar year ended
December 31st, 1958.

An audited statement of receipts and disbursements of
the Alberta Power Commission will be sent under separate cover.

Respectfully submitted,

ALBERTA POWER COMMISSION

J. G. MacGregor,
Chairman.

ALBERTA POWER COMMISSION

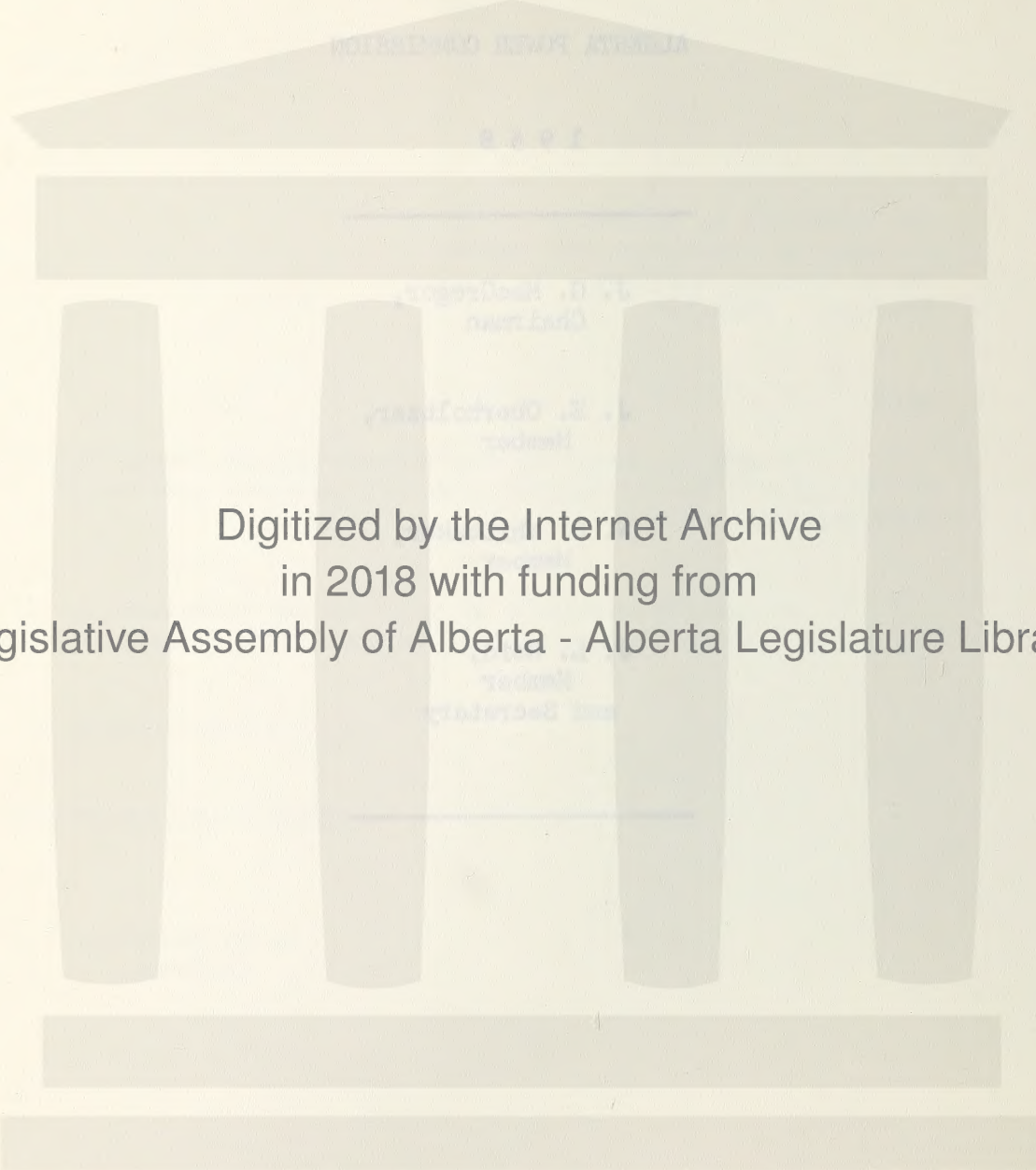
1958

J. G. MacGregor,
Chairman

J. E. Oberholtzer,
Member

W. C. Whittaker,
Member

J. L. Reid,
Member
and Secretary



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P R E F A C E

The Alberta Power Commission is not an operating Commission; that is, it does not own or operate any power plants, transmission lines or distribution systems. In this respect it is different from the Power Commissions in all the other Provinces, except Prince Edward Island and Newfoundland. Keeping this in mind, it might be well to consider the duties and the responsibilities of the Power Commission. Its duties at present, under the Power Commission Act, are only those of a regulatory or supervisory nature. These duties are largely covered by Section 6 of the Power Commission Act, which is as follows:

"Whenever required so to do by the Lieutenant Governor in Council the Commission shall inquire into, examine and investigate, -

- (a) water powers and water privileges in Alberta, their value and capacity;
- (b) the existing facilities for the manufacture and distribution of power in Alberta;
- (c) such other matters relating to power and its distribution in Alberta as the Lieutenant Governor in Council from time to time may require;

and shall report thereon to the Lieutenant Governor in Council".

The Commission feels that its principal duties at the present time are threefold:

1. The collection of statistics of the Central Station Industry in the Province, and the study of these statistics so that the people of the Province will have a true picture of the industry.
2. The study of hydro-electric sites and other power possibilities in the Province. During the past year there have been no direct studies of specific

hydro-electric sites. The Commission, however, has been engaged in a study of the existing network of transmission lines in the Province with particular reference to more extensive interconnection which will ensure the most efficient use of the large generating units which are already in operation and of those anticipated in the future.

3. Farm Electrification. This is the phase of its work to which the Commission has devoted most of its time. As the number of electrified farms increases the problems of farm electrification become more complicated. The Commission has devoted a great deal of effort towards making farm electrification available in some of the more remote areas of the Province. Many surveys have been made of farming areas and more will be carried out during the next year. The question of saturation of farm electrification has been studied and is discussed later in the report.



“SWAN HILLS AREA” - Courtesy Home Oil Co. Ltd.

ALBERTA POWER COMMISSION

ANNUAL REPORT

For Year Ending December 31st, 1958

The year 1958 continued the remarkable progress of the last decade in the growth of the electrical system in the Province. The following comments deal with the Province as a whole.

K.W.H. Generated. The increase in K.W.H. generated over that of the previous year was 10%. The generation by the hydro plants increased 23%, while that of the steam plants increased 4%. The hydro plants were operated in the most efficient manner possible making the best use of all their water.

Internal combustion plants increased their output by 14%. This power, of course, is generally that generated by Northland Utilities Limited and Canadian Utilities Limited in the Peace River country and includes the power generated by the gas turbine at Valleyview and where the increase in demand for power is quite large. This has been due in part to the increased activity in the Sturgeon Lake oil field and to some small extent to the necessity for power in the Swan Hills.

Peak Load. The increase in peak load for the Province has been nearly 20% over the peak load for the year 1957. Much of this increased percentage is due to the fact that December, 1957, was a very mild month. This large increase in peak load should be regarded, then, as an actual increase of about 10% a year for a two-year period. The following figures are an estimate of the actual coincident peak for the Province.

System	Estimated Peak Load K.W., 1958
Interconnected system, less East Kootenay Power Co. Ltd.	556,400
East Kootenay Power Co. Ltd.	3,000
Canadian Utilities Ltd. (Peace River country) (McMurray)	8,300 255
Northland Utilities Ltd.	9,100
	<u>577,055</u>
	say, 577,000

Transmission lines in the Province increased by 1,234 miles to a total of 12,020, which includes 2,915 miles of Company-owned farm lines. Distribution line mileage increased 258 miles to 4,264. The total mileage of all farm lines increased by 3,791 miles, so that the total farm mileage at the end of 1958 was 35,352. The total mileage of all power lines in the Province at the end of December, 1958, was 48,721.

Tables No. 1 to 8 which follow provide the summary of the most recent statistics:

Table No. 1. shows the capacity in M.W. of the Central Electric Stations in Canada for the past ten years.

TABLE NO. 1

Capacity of Central Electric Stations

<u>Year</u>	<u>Alberta</u>	<u>M.W. Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1947	158	7,165	197	332
1948	165	7,491	218	350
1949	207	7,939	232	350
1950	208	8,734	234	445
1951	280	9,724	272	457
1952	288	10,613	322	542
1953	372	11,687	347	561
1954	405	12,479	356	561
1955	477	13,422	394	637
1956	572	14,376	415	637
1957	596	15,695	452	644
1958	718			

Increase during the 10 year period ended 1957

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1957	596	15,695	452	644
1947	158	7,165	197	332
	—	—	—	—
Increase:	438	8,530	255	312
Percent Increase:	277%	119%	129%	94%
Increase Alberta:	1948 to 1958 - 335%			

Figures from 1947 to 1956 have been taken from Dominion Bureau of Statistic's publications. Some of the 1957 figures are not yet available from the Dominion Bureau of Statistics and in some cases other sources of information have been used.

Table No. 2. shows the growth of K.W.H. generated net during the past ten years.

TABLE NO. 2

Electric Energy Generated by Central Electric Stations

(Millions of K.W.H.)

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1947	641	43,424	763	2,032
1948	724	42,390	805	2,056
1949	801	44,419	858	2,160
1950	869	48,494	903	2,449
1951	997	54,852	979	2,565
1952	1,174	59,409	1,079	2,699
1953	1,340	62,860	1,174	2,754
1954	1,498	65,936	1,292	3,011
1955	1,729	72,911	1,482	3,104
1956	2,020	78,004	1,551	3,334
1957	2,243	81,637	1,678	3,341
1958	2,475			

Increase during the 10 year period ended 1957

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1957	2,243	81,637	1,678	3,341
1947	641	43,424	763	2,032
Increase:	1,602	38,213	915	1,309
Percent Increase:	250%	88%	120%	64%
Increase Alberta:	1948 to 1958 - 242%			

Figures from 1947 to 1956 have been taken from Dominion Bureau of Statistic's publications. Some of the 1957 figures are not yet available from the Dominion Bureau of Statistics and in some cases other sources of information have been used.

TABLE NO. 3

Annual K.W.H. used per Domestic and Farm Customer

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1947	882	1,951	1,034	4,304
1948	989	2,078	1,115	4,628
1949	1,073	2,168	1,199	4,694
1950	1,224	2,413	1,353	4,783
1951	1,384	2,617	1,531	4,813
1952	1,473	2,809	1,677	4,868
1953	1,624	3,008	1,878	4,960
1954	1,865	3,271	2,072	5,229
1955	1,975	3,500	2,483	5,420
1956	2,256	3,740	2,361	5,636
1957	2,373	3,960	2,577	5,895

These are Dominion Bureau of Statistics figures.

Increase during the 10 year period ended 1957

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1957	2,373	3,960	2,577	5,895
1947	882	1,951	1,034	4,304
Increase:	1,491	2,009	1,543	1,591
Percent increase:	169%	103%	149%	37%

Manitoba has an exceptionally high figure for K.W.H. used per domestic customer. This is partly due to the fact that one city alone - Winnipeg - contains a large percentage of the total population of the province. It is also due to the fact that the cost of developing the water power sites adjacent to Winnipeg was possibly the cheapest in the world. This provided cheap power for the people of the City of Winnipeg, and since fuel was expensive there, electricity was used extensively for cooking and heating, and a happy combination of low rates produced high use, and vice versa.

The figures for Canada for K.W.H. used per year per domestic customer is high because it takes into account the high consumption in Manitoba, and in Ontario.

TABLE NO. 4

Costs in Cents per K.W.H. Domestic Customers Only

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1947	3.93	1.60	4.27	1.08
1948	3.72	1.60	4.09	1.06
1949	3.54	1.59	3.95	1.11
1950	3.28	1.61	3.80	1.15
1951	3.16	1.65	3.70	1.18
1952	3.06	1.65	3.59	1.21
1953	2.91	1.70	3.52	1.23
1954	2.75	1.69	3.39	1.25
1955	2.64	1.66	2.93	1.18
1956	2.51	1.64	3.17	1.15
1957	2.44	1.62	3.11	1.13

These are Dominion Bureau of Statistics figures.

Decrease during the 10 year period ending 1957

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1947	3.93	1.60	4.27	1.08
1957	2.44	1.62	3.11	1.13

Percent Decrease 38% Increase 1% Decrease 27% Increase 5%

TABLE NO. 5

Total Number of Customers of Central Electric Stations
(Thousands)

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1946	121	2,477	90	131
1947	131	2,643	97	148
1948	142	2,822	106	151
1949	157	3,076	114	163
1950	172	3,270	121	179
1951	186	3,440	127	194
1952	200	3,621	139	209
1953	221	3,817	151	221
1954	239	4,002	170	234
1955	267	4,225	185	243
1956	276	4,426	206	254
1957	* 292			
1958	* 311			

Increase during the 10 year period ending 1956

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1956	276	4,426	206	254
1946	<u>121</u>	<u>2,477</u>	<u>90</u>	<u>131</u>

Increase: 155 1,949 116 123

Percent Increase: 128% 79% 129% 94%

TABLE NO. 6

Number of Farms Served by Central Electric Stations
as at December 31 each year

<u>Year</u>	<u>Alberta</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1948	3,393	1,227	5,694
1949	5,017	2,299	11,155
1950	* 11,032	4,057	16,964
1951	* 13,479	5,594	23,777
1952	* 18,055	8,591	29,623
1953	* 24,181	13,850	33,601
1954	* 30,504	21,287	37,422
1955	* 34,768	31,619	38,277
1956	* 37,658	38,495	38,091
1957	* 41,130	* 47,000	41,578
1958	* 45,848	* 51,500	* 42,000
** Percentage:			
	65%	63%	95%

TABLE NO. 7

Consumption in K.W.H. per Farm per Year

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1946	1,752	1,558	940	1,077
1947	1,690	1,686	900	1,678
1948	1,883	1,711	860	1,940
1949	2,128	1,752	880	2,113
1950	2,250	1,932	880	2,359
1951	2,461	2,085	1,266	2,475
1952	2,747	2,228	1,527	2,666
1953	2,604	2,420	1,915	2,943
1954	2,958	2,672	2,053	3,541
1955	* 2,892	2,803	2,054	3,564
1956	* 3,040	3,060	2,217	3,911
1957	* 3,564			
1958	* 3,530			

* Figures marked thus are Alberta Power Commission figures, and others are from the Dominion Bureau of Statistics.

** Percentage that is electrified of farms on which someone lived according to the 1956 Census.

TABLE NO. 8

Total Pole Line Mileage
(Includes transmission, distribution and rural lines)

<u>Year</u>	<u>Alberta</u>	<u>Canada</u>	<u>Saskatchewan</u>	<u>Manitoba</u>
1946	5,450	89,231	4,920	5,739
1947	6,271	98,530	4,353	8,262
1948	7,552	113,411	5,009	11,564
1949	10,103	135,329	5,371	16,785
1950	12,108	151,726	5,712	20,472
1951	15,125	170,582	9,574	24,439
1952	20,188	190,316	13,858	28,514
1953	26,211	213,176	20,899	32,237
1954	* 31,736	228,158	26,177	33,615
1955	* 36,233	243,773	33,755	33,219
1956	* 39,430	265,389	44,516	34,232
1957	* 43,404			
1958	* 48,721			

* Figures marked thus are Alberta Power Commission figures, the others are from the Dominion Bureau of Statistics.

TABLE NO. 9

K.W.H. Generated per Capita

<u>Year</u>	<u>Population</u>	<u>K.W.H. Generated x 10⁶</u>	<u>K.W.H. Generated/Capita</u>
1947	825,000	641	777
1948	854,000	724	848
1949	885,000	801	905
1950	913,000	869	952
1951	939,000	1,055	1,123
1952	970,000	1,213	1,250
1953	1,002,000	1,341	1,338
1954	1,039,000	1,499	1,443
1955	1,066,000	1,728	1,621
1956	1,123,000	2,019	1,798
1957	1,160,000	2,243	1,934
1958	1,201,000	2,475	2,061

PRESENT STATUS OF THE INDUSTRY

The Statistics for the Central Station Industry for the year 1958 follow. Some of the minor figures are estimates only due to the fact that the report has to be prepared before the various utilities have completed their statistics for the past year. These minor estimates will not be in error by more than 1% or 2%, so that the error in the whole will be negligible. Wherever a figure has been estimated it is marked "Est."

Tables 10 to 13 deal with plant capacity, peak load, and K.W.H. generated. They break up the figures to show what was generated by hydro, steam and internal combustion engines, and also to show the proportions generated by the publicly owned and the privately owned plants. Table No. 13 gives further details of the generating plants and their output. It will be noted that it is divided into three groups, A. B. and C.

The largest, Group A., contains those power plants which are connected by transmission lines, so that we speak of them as being in the interconnected system. Group A. covers most of the Province. As well as including the towns served by the Calgary Power Ltd., and Canadian Utilities Limited, and the area adjacent to Athabasca which is served by Northland Utilities Limited (except for the Grande Prairie area), it includes the cities of Edmonton, Calgary, Red Deer and Medicine Hat, and the Towns of Ponoka, Fort MacLeod and Cardston. In most cases these places do not generate their own power, but purchase it from Calgary Power Ltd., and retail it to their inhabitants. This group includes the hydro plants of Calgary Power Ltd., which are rated as follows:

Plant	Capacity	
	H.P.	K.W.
Bearspaw	- 22,000	17,000
Ghost	- 67,450	51,000
Horseshoe	- 20,000	14,000
Kananaskis	- 24,000	19,000
Barrier	- 16,000	13,000
Cascade	- 46,000	36,000
Rundle	- 23,000	17,000
Spray	- 62,000	50,000
Three Sisters	- 3,600	3,000
Pocaterra	- 18,400	15,000
Interlakes	- 6,900	5,000
	309,350	240,000

Group B. takes in the Peace River country and includes the territory served by Canadian Utilities Limited and Northland Utilities Limited. The systems of these companies are tied together by transmission lines from Fairview to Rycroft and from Valleyview to High Prairie, so that now the whole of the Peace River country is one interconnected system.

Group C. includes various isolated towns served by Northland Utilities Limited in the area north and west of Edmonton, and the Town of McMurray served by Canadian Utilities Limited.

In 1958 the interconnected system shown as Group A. had a combined capacity of 688,300 K.W., and generated 2,418,547,000 K.W.H. It served 298,090 customers. This system accounts for 96% of the generating capacity of the Province, 98% of the K.W.H. generated, and 96% of the number of customers.

The interconnected system shown as Group B. (Peace River country), had a combined capacity of 24,150 K.W. and generated 48,869,000 K.W.H. and served 12,312 customers.

TABLE NO. 10

The following Companies or Municipalities provide Central Station Electrical Service in the Province. This table gives preliminary data as to their plant capacity, their loads, and the K.W.H. they generated net in 1958.

Privately Owned

<u>Name of Company</u>	<u>Plant Capacity Dec. 31/58 K.W.</u>	<u>Peak Load (KW) on plants during 1958</u>	<u>K.W.H. Gen. Net - 1958 (thousands)</u>
1.			
Calgary Power Ltd.	384,000	326,900	1,384,080
Canadian Utilities Ltd.	86,025 (1)	57,600	219,420 (2)
Northland Utilities Ltd.	13,279	9,600	25,504
East Kootenay Power Co. Ltd. (3)	12,500	5,600	183
1. Total:	<u>495,804</u>		<u>1,629,187</u>

Publicly Owned

<u>Name of Municipality</u>			
2.			
City of Edmonton	155,000	132,000	530,836
City of Lethbridge	23,500	13,400	55,559
City of Medicine Hat	43,400	41,000	260,370 (4)
2. Total:	<u>221,900</u>		<u>846,765</u>
Plus 1. Total:	<u>495,804</u>		<u>1,629,187</u>
GRAND TOTAL:	<u><u>717,704</u></u>		<u><u>2,475,952</u></u>

- (1) Includes one 1,200 K.W. unit at Fairview.
- (2) Includes some K.W.H. generated at Fairview.
- (3) The East Kootenay Power plant is located at Sentinel some two or three miles inside the Alberta border. While this energy is generated in Alberta, most of it is exported to British Columbia.
- (4) Includes 189,934,700 K.W.H. sold to Calgary Power Ltd.

TABLE NO. 11

It is interesting to rearrange the figures of Table No. 10 so as to list them according to whether the power was generated by hydro, steam or internal combustion plants.

HYDRO

Name of Company	Plant Capacity Dec. 31/58 K.W.	Peak Load (KW) on plants during 1958	K.W.H. Gen. Net - 1958 (thousands)
Calgary Power Ltd.	240,000	232,800	985,753
Northland Utilities Ltd.	1,600	750	4,678
Total Hydro:	241,600		990,431

STEAM

Calgary Power Ltd.	144,000	137,000	398,263
Canadian Utilities Ltd. (5)	68,500	49,300	184,983
East Kootenay Power Co. Ltd. (1)	12,500	5,600	183
City of Edmonton (7)	155,000	132,000	530,836
City of Lethbridge (7)	23,500	13,400	55,559
City of Medicine Hat	43,400	41,000	260,370 (2)
Total Steam:	446,900		1,430,194

INTERNAL COMBUSTION

Calgary Power Ltd.			64
Canadian Utilities Ltd. (6)	17,525 (3)	8,300	34,437 (4)
Northland Utilities Ltd.	11,679	8,850	20,826
Total Internal Combustion:	29,204		55,327
GRAND TOTAL:	717,704		2,475,952

(1) See footnote (3) on Table No. 11.

(2) Includes 189,934,700 K.W.H. sold to Calgary Power Ltd.

(3) Includes 1,200 K.W. unit at Fairview.

(4) Includes some K.W.H. generated at Fairview.

(5) Includes Gas Turbine - Vermilion.

(6) Includes Gas Turbine - Valleyview.

(7) Includes Gas Turbine.

TABLE NO. 12

The following table may be of interest as showing the relative position of steam, hydro and internal combustion in the Province, December 31, 1958.

<u>Method of Generation</u>	<u>% of Power Generated</u>	<u>% of Capacity</u>
Hydro	40.0	33.7
Steam & Gas Turbine	57.8	62.2
Internal Combustion	2.2	4.1
	100	100
Publicly owned	34.2	30.9
Privately owned	65.8	69.1
	100	100

TABLE NO. 13

SUMMARY OF GENERATING PLANTS IN ALBERTA

AS AT DECEMBER 31, 1958

Owner	Hydro		Steam		Internal Combustion	
	K.W. Rating	K.W.H. gener- ated, 1958 (thousands)	K.W. Rating	K.W.H. gener- ated, 1958 (thousands)	K.W. Rating	K.W.H. gener- ated, 1958 (thousands)
A. Within the inter-connected system						
Calgary Power Ltd. (only)	240,000	985,753	144,000	398,263		64
Canadian Utilities Ltd.			68,500 (1)	184,983 (1)		
East Kootenay Power Co. Ltd.			12,500	183		
City of Edmonton			155,000 (1)	530,836 (1)		
City of Lethbridge			23,500 (1)	55,559 (1)		
Athabasca System (N.U.L.)			43,400	260,370	1,400	2,536
City of Medicine Hat						
TOTAL GROUP A:	240,000	985,753	446,900	1,430,194	1,400	2,600
B. Peace River Interconnected System						
Canadian Utilities Ltd.					17,000 (1)	33,441 (1)
Northland Utilities Ltd.					7,150	15,428
TOTAL GROUP B:					24,150	48,869
C. Isolated Systems						
Northland Utilities Ltd.						
Jasper	1,600	4,678			2,225	1,499
Lac La Biche					614	1,154
Pt. Vermilion					165	200
Wabasca (2 mos.)					125	9
Canadian Utilities Ltd.						
McMurray					525	996
TOTAL GROUP C:	1,600	4,678			3,654	3,858
TOTAL ALL GROUPS:	241,600	990,431	446,900	1,430,195	29,204	55,327
GRAND TOTAL:		717,704	2,475,952			

(1) Includes gas turbines

TABLE NO. 14

Total Circuit Miles of Transmission Lines in the
Province by Regional Groups as at December 31, 1958.
This includes Company-owned Farm Lines, but does not
include the Co-operative-owned Farm Lines.

VOLTAGE

<u>2,300 to 22,000 V.</u>	<u>33,000</u>	<u>50,000 to 72,000 V.</u>	<u>132,000 V. & greater</u>	<u>Total</u>
-------------------------------	---------------	--------------------------------	-------------------------------------	--------------

A. Within the Interconnected
System

Calgary Power Ltd.	6,441	29	1,084	970	8,524
Canadian Utilities Ltd.	1,636	226	425	143	2,430
City of Medicine Hat	30				30
East Kootenay Power Co. Ltd.	26		48		74
Total Group A.	8,133	255	1,557	1,113	11,058

B. Systems Within the Peace
River Country

Canadian Utilities Ltd.	307	30	124		461
Northland Utilities Ltd.	305		98		403
Total Group B.	612	30	222		864

C. Isolated Towns

Northland Utilities Ltd.

Jasper	27				27
Athabasca	50				50
Lac La Biche	15				15

Canadian Utilities Ltd.

McMurray	6				6

Total Group C.	98				98
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TOTAL ALL GROUPS	8,843	285	1,779	1,113	12,020

TABLE NO. 15

SUMMARY OF DISTRIBUTION SYSTEMS IN ALBERTA

As at December 31, 1958

	Total Number of Customers Served (Includes Rurals)	K.W.H. Sold (Less Sales to other Co.s) (thousands) (Includes Rurals)	Circuit Miles of Line (Excludes Rurals)
A. Within the Interconnected System			
Calgary Power Ltd.	98,600	905,000	1,573
Canadian Utilities Ltd.	33,244	143,072	549
East Kootenay Power Co. Ltd. (1)	1,117	6,158	21
City of Edmonton	72,070	449,785	722
City of Calgary	67,500	455,000 (Est.)	700 (Est.)
City of Lethbridge	9,927	46,349	116
City of Medicine Hat	7,050 (Est.)	70,435 (Est.)	130 (Est.)
City of Red Deer	4,492	19,739	51
Town of Cardston	902	2,759	30
Town of Fort MacLeod	900 (Est.)	2,400 (Est.)	20 (Est.)
Town of Ponoka	1,269	4,444	24
Athabasca System (N.U.L.)	1,019	2,380	37
TOTAL GROUP A.	298,090	2,107,521	3,973
B. Systems Within the Peace River			
Canadian Utilities Ltd.	6,359	22,038	111
Northland Utilities Ltd., including High Prairie, McLennan, Valleyview and Manning	5,953	15,240	127
TOTAL GROUP B.	12,312	37,278	238
C. Isolated Towns			
Northland Utilities Ltd.			
Jasper	663	5,202	24
Lac La Biche	391	1,067	9
Fort Vermilion	67	140	4
Wabasca (2 mos.)	6	7	6
Canadian Utilities Ltd.			
McMurray	314	881	10
TOTAL GROUP C.	1,441	7,297	53
GRAND TOTAL :	311,843	2,152,096	4,264

(1) Includes Towns of Coleman, Frank, Cowley, etc.

TABLE NO. 16

SUMMARY OF RURAL ELECTRIFICATION SYSTEMS IN ALBERTA

As at December 31, 1958

	Number Served		Number Non-Farmers Served	Total Number Customers	Circuit Mile of Line
	Farmers Served				
A. Within the Interconnected System					
Calgary Power Ltd.					
Experimental Areas and Individual Rurals (1)	4,036	846		4,882	2,371
R.E.A.'s	28,489	5,334		33,823	21,266
Canadian Utilities Limited					
Experimental Areas and Individual Rurals (1)	770	110		880	390
R.E.A.'s	9,049	753		9,802	8,367
Northland Utilities Limited - Athabasca System					
Experimental Areas and Individual Rurals (1)	3	14		3	2
R.E.A.'s	404			418	384
East Kootenay Power Co. Ltd.					
R.E.A.'s and Lundbreck Co-op.	124	51		175	136
Adjacent to Cities, etc. (1)	219			219	92
Total Group A.	43,094	7,108		50,202	33,008
B. Peace River Country					
Canadian Utilities Limited					
Experimental Areas and Individual Rurals (1)	69	99		168	40
R.E.A.'s	1,430	82		1,512	1,231
Northland Utilities Limited					
Experimental Areas and Individual Rurals (1)	125			125	19
R.E.A.'s	1,107	42		1,149	1,015
Total Group B.	2,731	223		2,954	2,305
C. Isolated Towns Served by Northland Utilities Limited					
Company-owned Rurals (1)	1			1	1
R.E.A.'s	22	18		40	38
Total Group C.	23	18		41	39
GRAND TOTAL:	45,848	7,349		53,197	35,352

(1) The lines to serve these farms are the property of the Power Companies. This mileage is also included in the table showing transmission lines under the heading of 2,300 to 22,000 volt lines, etc.

TABLE NO. 17

DATA RE CENTRAL STATIONS IN ALBERTA BY REGIONAL GROUPS
As at December 31, 1958

	Group A	Group B	Group C	Total
<u>Plants</u>				
K.W. Rating	688,300	24,150	5,254	717,704
K.W.H. Generated (thousands)	2,418,547	48,869	8,536	2,475,952
<u>Transmission</u>				
Miles of Line	11,058	864	98	12,020
<u>Distribution</u>				
Number of customers	298,090	12,312	1,441	311,843
K.W.H. sold (thousands)	2,107,521	37,278	7,297	2,152,096
Miles of line	3,973	238	53	4,264
<u>Rural</u>				
Number of farms (1)	43,094	2,731	23	45,848
Number of non-farms (1)	7,108	223	18	7,349
Miles of farm line (2)	33,008	2,305	39	35,352
Miles of R.E.A. line (3)	30,153	2,246	38	32,437

(1) Included in Number of Customers shown under Distribution Lines.

(2) Partly included in Number of Transmission Lines.

(3) Not included in Miles of Line shown under Distribution or Transmission Lines.

The following is a more detailed summary of the additions to generating capacity, transmission line facilities, etc., during the year 1958.

Calgary Power Ltd.

(1) Changes in Plant Capacity

During 1958 work was completed on the extension to the Wabamun Steam Plant. The second unit, which is a duplicate of the first with a rated capacity of 66,000 kilowatts but is capable of 72,000 kilowatts, was placed in operation in October, 1958.

During 1958 work on the extensions to the Spray and Rundle Plants was discontinued, but is scheduled to resume early in 1959. These extensions will add a 50,000 kilowatt unit to the Spray Plant and a 30,000 kilowatt unit to the Rundle Plant. These units are now scheduled for operation in the fall of 1960.

The investigations of the Brazeau River are still in progress.

(2) Additional Transmission Lines

During the year 1958, the Company built the following transmission lines:

Ghost to Edmonton	138 KV	Added two ground wires and also one extra conductor to each phase for the balance of the distance to Edmonton. 73 miles.
Medicine Hat to Calgary	138 KV	Added two ground wires. 175 miles.
Bellevue to Pincher Creek	138 KV	25.5 miles. This line has been built for eventual operation at 230 KV.
Pincher Creek to B.A. Gas Plant	138 KV	15.8 miles.
Wabamun to Keystone Oil Field and Drayton Valley	69 KV	46 miles.
From existing line near Duchess to Princess	23 KV	15 miles. This line was purchased from F.E.S.L. and converted to a three phase circuit.
Alder Flats to Willesden Green Oil Field	23 KV	18.3 miles

Joffre Oil Field	23 KV	7.2 miles.
Bellshill Lake Oil Field	23 KV	20 miles.
Pembina Oil Field extensions	23 KV	64 miles.

The High River 6,000 KVA 69/23 KV substation was rebuilt and extended. Two 69 KV oil circuit breakers were installed for improving the service continuity to the existing loads as well as to the new sulphur plant at Okotoks. Three new 23 KV breakers of adequate interrupting capacity and a new 10,000 KVA 23 KV voltage regulator were installed. The latter released a 5,000 KVA unit for use elsewhere.

At Wainwright a 6,000 KVA 69/23 KV transformer was installed.

At the S.W. Calgary substation an additional 69/13.2 KV 5,000 KVA transformer was installed for supplying new residential areas in south Calgary. The total transformer capacity at this station is now 20,000 KVA.

At Rockyford the 69/23 KV transformer capacity was increased from 2,000 KVA to 5,000 KVA.

At the Pincher Creek B.A. Oil Company gas plant the 69/23 KV substation was extended. This included the installation of two 69 KV oil circuit breakers to provide two line service for this plant. A new 6,000 KVA 69/4.16 KV transformer was added to the existing 3,000 KVA capacity.

The Wabamun 138 KV substation was extended with the installation of a 80,000 KVA 138/13.2 KV transformer to conform with the generating plant extension. A 25,000 KVA 69 KV voltage regulator was removed from the East Edmonton substation and installed at Wabamun.

At Boyle the 23 KV interconnection with Northland Utilities Limited was completed.

(3) During the year the following Towns, Villages and Hamlets were added to the system of Calgary Power Ltd.

Towns:	New Town of Hinton
	New Town of Lodgepole

Hamlets: Beaver Mines
Entrance
Glenevis
Ghost River Subdivision
Highbridge
Iddesleigh
Jenner
Lindale
Lynwood
Makepeace
Mercury Camp
Peers
Rocky Rapids
South Coaldale Subdivision
Stanger
Suffield.

(4) Service to Oil Fields, New Industries, etc.

During 1958, Calgary Power Ltd. received applications for an additional 145 oil well pump services, 94 battery pumping services, and well over 250 water pump services for secondary recovering methods together with numerous miscellaneous battery lighting, cathode rectifier stations, etc. Service was extended during 1958 to nearly 200 oil well pumping units, 250 water pumping units, totaling over 6,600 h.p., and 153 battery pumping services. New oil fields served during 1958 were Chancellor, Malmo, New Norway and Willesden-Green, though the majority of the above load was connected in the Pembina Field.

There has been the anticipated drop-off in the oil well pumping service applications during 1958, but this has been offset by the connected load in water flooding services, which had the effect of reducing the number of oil well pumping services required. The low level of crude oil marketing has actually resulted in a drop in the use of power by crude oil pumping stations during 1958. There has also been a re-appraisal of certain existing installations in the oil field services, with a downward trend to achieve minimum use and cost of power.

The coal mining load continued to decrease with some of the smaller mines closing their operations.

The largest single increase in industrial load connected during 1958 was the addition to the sulphur plant near Pincher Creek. This load was doubled

to over 3,000 h.p. Increases were also experienced in many industrial loads, oil refineries, metals refining and polythene manufacturing and processing. Though the cement industry lagged during the first half of 1958, it became much stronger during the latter half.

Additional industrial load in the form of plants for feed processing, sand and gravel, wood preserving and saw mills have been connected during the year. New types of industrial load have been connected in the form of a propane storage development and a wood fibre board plant.

Canadian Utilities Limited

(1) Changes in Plant Capacity

Early in 1958, Canadian Utilities Limited, commissioned the 10,000 K.W. Sturgeon Plant, their second gas turbine, after better than expected results in the operation of the epoch making Vermilion gas turbine, the first such unit in Canada, which was installed in 1954.

The Sturgeon plant is believed to be the only such unit burning sour flare gas which is obtained from nearby oil wells.

In the rapidly developing Swan Hills oil field, the company installed two 100 h.p. diesel units and planned further installations to keep pace with winter developments.

(2) (a) Transmission Lines

22 miles of 69 KV line from near Rowley to Three Hills.

55 miles of 138 KV line from Vegreville to Vermilion. This line is built for 138 KV operation but will operate initially at 69 KV.

22 miles of 69 KV line from Vegreville to a point near Hairy Hill.

36 miles of 23.9 KV line from the Sturgeon Oilfield to Fox Creek.

(b) Substations

New 5,000 KVA 69/23.9 KV substation to serve the Three Hills area.

Additional automatic switching equipment in the South Stettler substation to improve service in that area.

Additional switching equipment in the Vegreville and Vermilion substations to tie in new lines in that area.

A new 3,000 KVA 69/23.9 KV substation for the Willingdon area, located between Willingdon and Hairy Hill.

A new 3,000 KVA 69/23.9 KV substation near Bonnyville to serve increased requirements of the Bonnyville - Grande Centre area.

A new 3,000 KVA distribution substation for converting the distribution system of Grande Prairie to 4,160 volts.

(3) Towns and Villages added to the Company's system in 1958

Silverwood
Fox Creek
Dorothy

(4) Service to Oil Fields, New Industries, etc.

During 1958 Canadian Utilities Limited connected a variety of new loads and industries:

A temporary diesel plant was operated by the company at Fox Creek, serving that hamlet, an oil pumping station, and nearby "Kaybob" oil field, until a transmission line from the Sturgeon Plant was completed in November.

In the Swan Hills area, the company connected batteries, pipeline pumps, camps and townsite.

In the South, new oil fields connected included the Thompson Lake wells, injection pumps and batteries, and the new Cessford area oil wells. A new oil well-mud plant near Rosalind was under construction near the end of the year.

With natural gas developments, the company brought service to 30 new houses and 3 Alberta Gas Trunk Line metering stations near Cessford, and a gas compressor and processing plant near Consort.

Service was also extended to mink farms near Lesser Slave lake, a lumber company in Grande Prairie, as well as seed cleaning plants and miscellaneous new town water systems throughout the areas served.

A special agreement with Northland Utilities resulted in savings to both companies through the sale of off-peak power to Northland Utilities' towns south of Peace River during the summer.

Northland Utilities Limited

(1) Changes in Plant Capacity

A new plant building was erected to house the Lac La Biche generating plant and to provide space for larger units to be put there in 1959.

A small development plant and distribution system was put into operation at Wabasca where presently the Dominion Government is placing in operation a large Indian Residential School.

At the year end preparations are under way to install a 3,000 KW gas diesel unit at Fairview. This unit increases the capacity of this plant to 8,500 KW, 1,250 being operated for Canadian Utilities Limited.

An interchange connection was provided near Boyle with Calgary Power Ltd. which increases the reliability of both systems.

(2) Transmission Lines

The largest project completed in 1958 was the erection of a 50 mile 72 KV transmission line from Fairview to Peace River. The completion of this line made increased capacity available to the Town of Peace River and provided two additional line routes to the town. It now is possible to transmit the full capacity of the Fairview plant.

An extension was made from Lac La Biche to the original Lac La Biche Roman Catholic Mission, some 10 miles west of Lac La Biche.

(3) Towns and Villages added to the Company's system in 1958

Worsley
Wabasca

City of Edmonton

Changes in Plant Capacity

During the year the first 30,000 KW gas turbine was commissioned. A similar unit is scheduled for completion in 1959. These gas units are the largest gas turbines installed anywhere in the world. While there are other similar units being installed elsewhere in Canada, Edmonton's units will generate the highest electrical load. As the temperature decreases gas turbines can be operated at higher loads. For this reason these units will be operated at a higher load than in similar turbines anywhere else in the world.

City of Lethbridge

Changes in Plant Capacity

During the year the City's first 10,000 KW gas turbine was brought on the line.

Both Northland Utilities Limited and Canadian Utilities Limited are showing considerable interest in the hitherto undeveloped part of Northern Alberta north of the 55th Parallel. Canadian Utilities Limited, for instance, which recently commenced operations in the Yukon Territories and a year ago took over the power plant at McMurray, is now on the point of entering the power business at Chipewyan. Nearer at hand this Company has installed a temporary diesel plant in the Swan Hills (Twp. 67, Rge. 10, W.5th) to serve the rapidly expanding oil producing area there and to provide the power to pump oil through the recently completed Swan Hills - Edmonton pipe line. In due course transmission lines will

be built into this area from Valleyview and perhaps also from Kinuso, so that this temporary plant can be shut down.

During 1957 Northland Utilities Limited installed a diesel plant in Ft. Vermilion. This plant can be used to supply power to farms in the vicinity of Ft. Vermilion and High Level and provides the nucleus of a power system which can be extended to meet the needs of that sector of the Province. This Company has applied to the Power Commission for authority to install a plant at High Level and it is hoped that a transmission line connecting Ft. Vermilion and High Level may not be too far in the future. During 1958 Northland Utilities Limited installed a power plant at Desmarais and built about five miles of line to serve the Hamlet of Wabasca. The Company has recently applied for approval to the installation of a power plant in the Red Earth oil field.

These are all indications of the renewed interest in Northern Alberta and of the faith these power companies repose in the future of that area.

The vast energy resources of Alberta consisting of hydro plant sites, one-half of the mineable coal of Canada and a very large percentage of all the oil and natural gas resources of Canada, places the Province in a very fortunate position energywise. Energy resources are not confined to the southern half of the Province. The total hydro power potential of Northern Alberta exceeds 2,700,000 h.p., of which 1,600,000 h.p. is available on the Athabasca River as shown in the following table and the accompanying map:

Power Sites on Athabasca River Below 19th Baseline

Site Name	Location	Full Supply Level	Maxi- mum Head	Continu- ous Plant Output K.W.	Installed Turbine Capacity H.P.
19th Baseline	Twp. 72-18-4	1,675	100	28,800	104,000
Pelican Rapids	Twp. 79-17-4	1,575	155	59,400	222,000
Grand Rapids	Twp. 84-17-4	1,420	203	93,300	378,000
Mile 193	Twp. 87-15-4	1,217	137	81,000	305,000
Crooked Rapids	Twp. 87-12-4	1,080	168	97,000	365,000
Mile 236	Twp. 88-10-4	912	92	62,700	223,000
Totals:				422,200	1,597,000
				(Say-	1,600,000)

All of this power is within economical transmission distance of Edmonton and can be tied into the main transmission network serving those areas of the Province which have heavy power requirements.

In Northern Alberta thermal power can be generated in small or large quantities anywhere that a fuel supply in the form of oil, gas or coal is available. Coal is very scarce in Northern Alberta and oil is an expensive fuel unless use is made of some by-product such as will be available when refining the Athabasca Oil Sands. The two fuels available for thermal power in Northern Alberta, then, are liquid coke in the area around McMurray and natural gas which in a general way may be said to be available south and west of a line drawn diagonally across Northern Alberta from the vicinity of Cold Lake in the southeast to Hay Lakes in the northwest corner. This means that thermal power in unlimited quantities could be generated in large steam plants located near the Athabasca Oil Sands area, or it could be generated from natural gas by using diesel engines for small lots of power, gas turbines for larger quantities and large steam plants for tremendous outputs. The cost of power generated by steam plants using this cheap fuel is about the same as the cost of hydro power in Alberta.

It will be seen, then, that if for the moment we leave out the power resources of the Slave River near Ft. Smith which could soon be developed to some extent to supply requirements of the northern mining areas, and also leave out consideration of the power available at Vermilion Chutes, Northern Alberta is still bountifully supplied with energy resources.

(1) A bounteous supply of thermal power of reasonable cost is available to the whole of the west half of Northern Alberta.

(2) A similar supply of thermal power will be available in the area around McMurray.

(3) Hydro power totalling 1,600,000 h.p. is available in the area around McMurray.

Generally speaking, all the potential hydro power which it would be practical to develop in the light of the economics prevailing today lies in the east half of Northern Alberta, while thermal power is available to the west half.

Much of this potential power outlined above may be called upon sooner than we realize because of the rapid development of the Swan Hills and Red Earth oil fields and the gas fields west and north of Whitecourt. Canadian Utilities Limited are contemplating a major transmission line from the vicinity of Valleyview to the Swan Hills and thence north to Kinuso. It may not be too long before a similar transmission line reaches into the area of the Red Earth oil field and this line could some day be extended east to pick up power from future hydro plants on the Athabasca.

While detailed plans for the next five years are included under the section headed "Forecast to 1963", this might be the place to look at the abundance of energy resources which are being considered for development in the south half of the Province. Calgary Power Ltd. is planning to commence the installation of its third unit at Wabamun - 150 M.W., coal-fired - and the City of

Edmonton is planning another 60 M.W. gas-fired steam turbine, while Canadian Utilities Limited has under consideration the question of the addition of a 30 M.W. or 60 M.W. unit to its Battle River plant. At the same time Calgary Power Ltd., in 1960, plans to install second units in its Spray and Rundle hydro plants which will be rated at 50 M.W. and 30 M.W., respectively. While all of these will probably be the next large units installed in the Province, consideration is also being given to a hydro development on the Brazeau River of which the initial unit would probably be 180 M.W. and this would ultimately be followed by three more units of the same size. This plant would eventually be used for peaking purposes.

Other good power possibilities that are not yet completely in focus are an extension of the City of Edmonton generating system by locating a coal-fired steam plant in some large coal field such as near Lake Wabamun; a large steam plant in the Crows Nest Pass using deep-seam coal which, while it might be relatively expensive fuel per ton, is nevertheless high in calorific value; and a fairly large hydro plant at Rapid Narrows on the South Saskatchewan below Medicine Hat.

Unlike some other regions in Canada where the power authorities are forced to contemplate installing nuclear power or to reach out hundreds of miles to bring in power from the hydro sites of the north, Alberta is abundantly supplied with sources of relatively cheap power. The problem is not one of searching for sites for power plants either thermal or hydro but is rather one of bringing into production whatever may be the most economical site at any given moment. The keynote of Alberta's planning, then, should be to make certain that at any time the next power plant to be built should be the one that will contribute the cheapest power to the excellent network of transmission lines which forms the backbone of the power system of the Province.

In the light of the rapidly rising cost of all commodities and services

and of material and labour, the power producers and distributors have done a remarkable job in keeping the retail cost of power down. Electric power is one of the very few commodities or services in Alberta that has not risen in price. While in many parts of Canada rates for power have had to be increased, the private power companies have so far been able to stave off such an increase, and much credit is due to them for their economical planning. How long they can continue to keep from raising rates is hard to say, but if left to themselves to select the most economical sites with the sole aim of producing the cheapest possible power for Alberta, we may hope to see this condition continue for at least a few years to come.

As shown by the map at the back of the Report, the network of high-voltage transmission lines is expanding and being co-ordinated year by year. The major power producers, Calgary Power Ltd., the City of Edmonton, Canadian Utilities Limited and Northland Utilities Limited, are bringing about interconnections which have the effect of utilizing their generating equipment to its utmost efficiency and this process will continue. If, by careful co-ordination, Calgary Power Ltd., the City of Edmonton and Canadian Utilities Limited, can safely postpone the installation of a unit of, say, 70 M.W. capacity for one year, a saving of some \$700,000.00 can be effected in the cost of power for Albertans.

The Continent of North America is approaching another explosion of population similar to that which commenced after the Second World War. Canada will share in this and Alberta, because of its great energy resources, will probably have more than its proportionate share. This indicates that it might be well to start now to take a careful look at energy resources and particularly at our coal reserves. We know that we have about one-half of all the mineable coal in Canada but beyond that our knowledge is somewhat limited as to the exact delineation of our various coal seams and the location of mineable deposits of

the order of 100 or 200 million tons, which will be required to supply the power plants of the relatively near future. We are only now coming to a realization of the fact that generally speaking in Alberta, power can be produced from coal more cheaply than from natural gas and similarly that thermal power is cheaper than hydro. Coal will produce our base load of the future, while gas and hydro will find their places - most valuable places - as peak load supplements to power from coal. For Alberta at least, because of its cheap fuels, nuclear power is still far in the future.

For the first 50 years after the settlement of Alberta began, its economy was predominately agricultural and great sums of money were spent in agricultural research, and rightly so. Marvelous changes in Alberta's economy followed the discovery of the Leduc oil field in 1946 and much of the boom experienced since then has been due to oil. Now that gas export on a large scale is in the offing, Alberta has another string to its bow and we may therefore expect a further boost in our economy and we may look forward to continuing expansion. The fourth boost of Alberta's economy can be anticipated as our eyes turn to Northern Alberta and the Northwest Territories, a field in which Alberta, with its economy strengthened by a vigorous petroleum industry, is in a position to play a major role in the opening up of Canada's Northern Frontiers. Then, still over the horizon as yet lie the great effects upon Alberta's industrial prospects, of our vast resources of energy to which Canada will turn in the near future.

The impact on Alberta of the increased continental population will call for the development of far greater quantities of power than those to which we are accustomed, even though our installed capacity has increased by 335% in the last ten years. These future demands for power will soon use the few power sites mentioned above and more and more we will turn to those in Northern Alberta and to our coal reserves. For this reason we should be bending our efforts to in-

creasing our knowledge of our coal deposits by means of much further research into their delineation and utilization.



"AERIAL VIEW OF INDIAN SCHOOL AND MISSION AT DESMARAIS"
Courtesy - Federal Government, Department of Public Works.

FORECAST TO 1963

At December 31, 1958, the capacity of the power plants in the Province was 718,000 K.W. At December 31, 1948 - 10 years ago - this capacity was 165,000 K.W., so that the increase during the 10 year period has been 335%, an amazingly large increase. The K.W.H. generated in 1958 were about three and one-half times the amount generated 10 years ago and showed an increase of 10% over the corresponding figure for 1957. While the increase in peak load over 1957 was nearly 20%, much of this large increase is due to the fact that December, 1957 was a very mild month. As a result the large increase in peak load experienced this year should be regarded as an actual increase of about 10% a year for a two-year period.

Table No. 18 shows the growth which we believe will take place in the electrical load of the Province from now until 1963. It shows the actual capacity in K.W. of the power plants in the Province as at December 31, 1957, the increase in capacity during 1958 and the estimated peak load that occurred in 1958. It then goes on to deal with these year by year until 1963, showing our forecast of peak load and what the Companies and Municipalities are planning to do to meet that peak load.

It will be seen from a study of Table No. 18 that there was ample reserve capacity to meet the load in 1958. The Power Commission has always felt that there should be enough reserve capacity in the power plants of the Province so that if the largest unit should break down during the December or January peak load period there would still be enough capacity to carry the load. The largest units in the Province at the moment are the 70,000 K.W. generators in the Wabamun plant. If either of these had broken down during the peak load in December, 1958, the various power plants, by pooling their resources, could have carried the load.

It appears that if the present plans for additional units are carried out we should have ample reserve capacity until 1963. It is hard to predict what

the peak load will be five years from now. It will be noted from Table No. 18 that during the forecast period it is planned to install more gas turbines. Canadian Utilities Limited, who installed the first one in Canada at their Vermilion plant, are well satisfied with this unit and have installed another in the Peace River country, while the City of Edmonton has put in one of 30,000 K.W. capacity and is proceeding with the installation of a duplicate unit. The City of Lethbridge has also installed a gas turbine. While gas turbines are not as economical as either diesel engines or gas fired steam plants in the cubic feet of gas used to produce a K.W.H., they do have a definite place in the production of power in Alberta. For one thing, they can use "sour" gas, which could not be used in diesel engines without scrubbing. Another advantage is that their installed cost per H.P. is considerably less than other prime movers. For this reason it is more economical to install them to handle peak loads where the load factor on the turbine will not be very high.

During 1957 the Calgary Power Ltd.'s second unit of 70,000 K.W. came on the lines at Wabamun. These are the largest units in Alberta. From now on it will be necessary to have 70,000 K.W. of spare capacity at all times. As the electrical load in the Province grows we may expect the size of these units to increase and by 1962 we expect to see a unit of 150,000 K.W. operating at Wabamun. These large steam units are considerably more efficient than smaller ones and installation of such large units will tend to keep the cost of power down. At the same time experience seems to point to the fact that these large steam turbines are a little more vulnerable to breakdown than hydro units. This being the case, it becomes increasingly important to watch our reserve capacity.

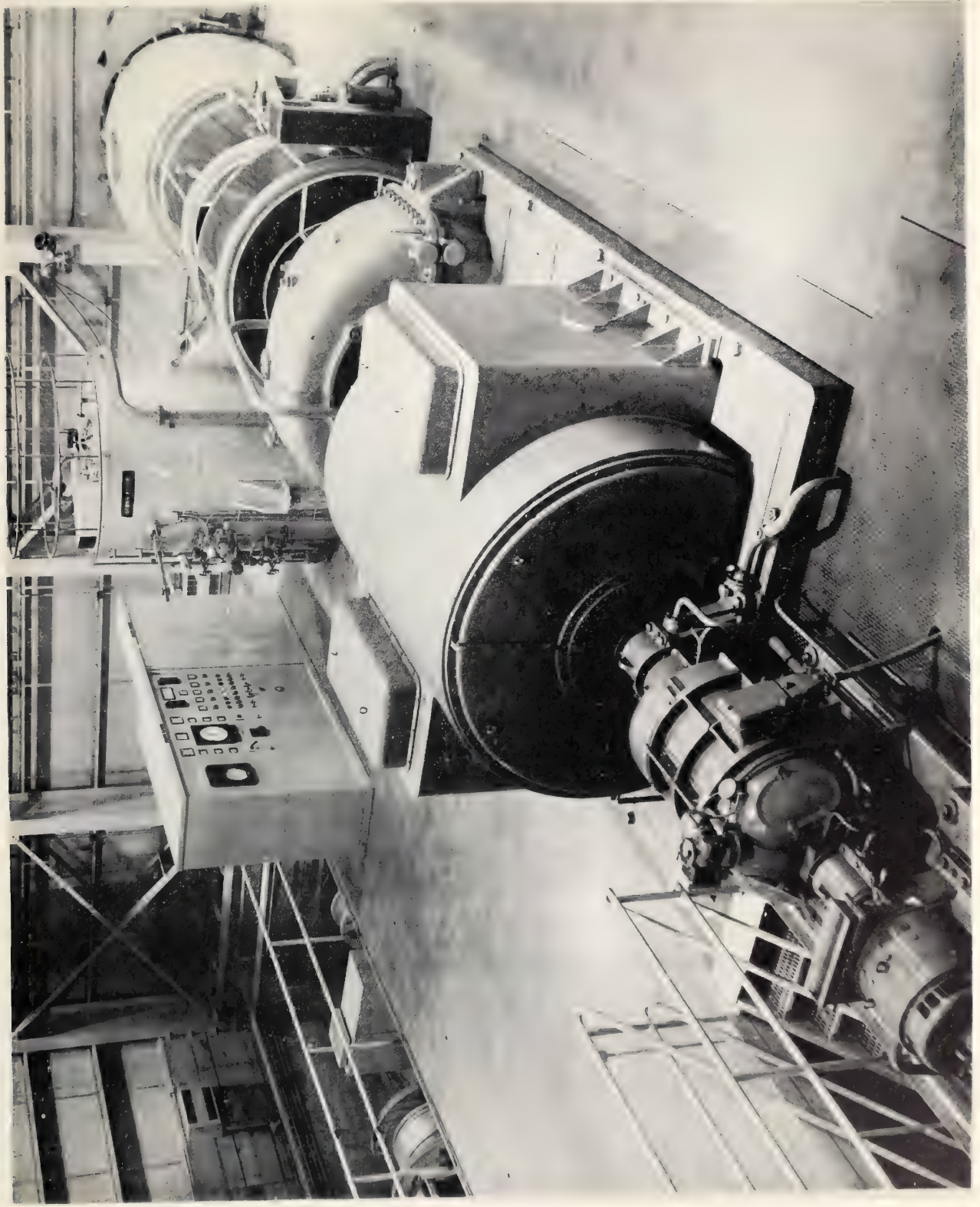
The question of reserve capacity is tied up with the question of inter-connecting transmission lines between the various systems. This problem is always being considered and will receive more study in the future. During 1958 a tie line was placed in operation between Boyle and Colinton thus tying Athabasca into the interconnected system.

TABLE NO. 18

Forecast of Generating Capacity in K.W.
(Not taking account of isolated small plants)

	<u>Capacity added during year</u>	<u>Capacity at end of year</u>	<u>Estimated Peak Load</u>
Capacity at Dec. 31, 1957		595,830	482,000
<u>Capacity added during 1958</u>			
Calgary Power Ltd. - Wabamun	72,000		
Canadian Utilities Ltd. - gas turbine	10,000		
City of Edmonton - gas turbine	30,000		
City of Lethbridge - gas turbine	10,000		
Less minor adjustments -	- 126		
Capacity added during 1958	121,874	121,874	
Total capacity Dec. 31, 1958		717,704	
		say 718,000	577,000
<u>Capacity to be added 1959</u>			
City of Edmonton - gas turbine	30,000		
Northland Utilities Ltd. - Fairview	3,000		
Capacity to be added 1959	33,000	33,000	
Total capacity Dec. 31, 1959		751,000	635,000
<u>Capacity to be added 1960</u>			
City of Edmonton - steam turbine	75,000		
City of Lethbridge - gas turbine	10,000		
Calgary Power Ltd. - Spray	50,000		
Calgary Power Ltd. - Rundle	30,000		
Northland Utilities Ltd. - Jasper	1,200		
Capacity to be added 1960	166,200	say 166,000	
Total capacity Dec. 31, 1960		917,000	700,000
<u>Capacity to be added 1961</u>			
Northland Utilities Ltd. - Fairview	3,000		
Capacity to be added 1961	3,000	3,000	
Total capacity Dec. 31, 1961		920,000	770,000

- carried forward -



"CITY OF LETHBRIDGE GAS TURBINE" - Courtesy City of Lethbridge

TABLE NO. 18
continued

Totals brought forward -		920,000	770,000
<u>Capacity to be added 1962</u>			
Calgary Power Ltd. - Wabamun	150,000		
Canadian Utilities Ltd. - Battle River	30,000		
Northland Utilities Ltd. - Fairview	5,000		
Capacity to be added 1962	185,000	185,000	
Total capacity Dec. 31, 1962		1,105,000	850,000
<u>Capacity to be added 1963</u>			
City of Edmonton - steam	75,000		
Capacity to be added 1963	75,000	75,000	
Total Capacity Dec. 31, 1963		1,180,000	930,000

FARM ELECTRIFICATION

During 1958, 4,718 farms have been added to the number already electrified in the Province to make a total of 45,848 bona fide farms electrified as at the end of the year. It is expected that another 3,000 farms will obtain Central Station service during 1959.

According to the 1956 Census, 79,424 farms were being operated in Alberta but only 70,058 of these were farms on which someone lived. The remaining 9,366 were being operated mainly by farmers who lived in towns or villages but did not live on their farm. Of these 70,058 farms, 739 were on Indian Reserves and if we deduct these we are left with the remainder of 69,319. If we accept the Census figures, which were compiled during the summer of 1956, then 66% of all farms were electrified as at the end of the year.

But it is sometimes difficult to find all the farms that the Census shows. Since 1956 and particularly in the grey-wooded soil areas, many farmers have left their land. The Power Commission has considered making a definite survey to find how many farms were still occupied, say, at the summer of 1958; but this would have been a rather futile performance for our purposes because the movement of the farms is continuing. The Saskatchewan Power Corporation did conduct such a survey during the last 12 months and came to the conclusion that at that time there were only 91.5% as many farms in that Province as were reported by the Census a year or so previously. If we presume that this percentage holds true in Alberta then there should be 91.5% of 69,319, or 63,500 farms, in the Province on which someone lives. If that is the case then, at the end of 1958, 72% of all the farms were electrified.

It will be seen by the map, which shows the saturation of farm electrification by Census Divisions as at December 31, 1958, that throughout the richest farming areas (Census Divisions 2, 3, 5, 6, 8 and 11) the saturation of farm

electrification is very high and that it becomes less in Divisions 7, 10 and 13. Census Divisions 9, 12, 14 and 15, include the fringe areas where agricultural income is the least and where, therefore, we might expect to find a smaller percentage of the farms electrified. There are many R.E.A. construction projects not yet finished and when, some time in the next two or three months, these are completed there will be a noticeable increase in the percentage of electrified farms in Divisions 12, 14 and 15.

It is not likely that very many more farms will be connected in Census Divisions 2, 5, 6 and 11. It is also unlikely that the saturation of electrified farms in Census Divisions 1 and 4 will ever increase into the 80% or 90% range because many of the farms and ranches in these two areas are so far removed from their nearest neighbours that for them farm electrification is impractical. On the other hand, we expect a large increase in the saturation in Census Divisions 12, 13, 14 and 15. Generally speaking, the existing network of lines covers these Divisions so completely that the lines are within a mile or two of a very high percentage of the farms in them. Here and there around the fringes of settlement there may be about 10 small groups of 15 or 20 farms each which, because they may be isolated by a gap of 5 miles or so from the nearest farm adjacent to existing lines, have not found it practical to get service. In other words, except for the farms in the Keg River and Fort Vermilion areas (to be discussed later) the network of lines makes it possible for nearly all farms to hook up.

When the farms not yet electrified but adjacent to lines will take service is another matter. Our experience in all areas south of Edmonton indicates that once the lines are built the farmers who could have taken service from them but did not hook up originally, came on within 5 or 6 years. Most of the 4,718 farms hooked up in 1958 were served by short taps off existing lines. While in the part of the Province from about Edmonton south the process of the

reduction of the number of farms due to consolidation into larger units appears to have almost reached a limit for the time being, this process is still going on in Census Divisions 12, 13, 14 and 15. There are many farmers who have power lines going past their doors who have not taken service due to uncertainty on their part as to whether or not they are going to stay on the farm. It is possible that the very fact that power is available will be sufficient to induce them to remain on the farm, but essentially that decision will have to be made on the basis of farm economics.

There are approximately 40 farms in the Keg River area and some 250 in the vicinity of Fort Vermilion and in the area west from there to High Level. Those in the Keg River area are at present too far removed from any source of power to make electricity economically attractive to them. The farms from High Level to Fort Vermilion and down into the LaCrete area have power available from Northland Utilities' plant at Fort Vermilion. A Rural Electrification Association has been formed in that region but so far there appears to be little interest in building lines.

The following table shows the number of farms connected as of December 31st, 1958, as well as those still under construction. It also shows the number of non-farm customers served off farm lines.

This table brings out one other point that is often overlooked; that is, the number of non-farmers, such as filling stations, machine shops and country stores, and the number of customers in hamlets who are getting service off these farm lines, and are able to get service only by virtue of the fact that these farm lines have been built. It should be remembered that service to these customers was possible only due to the spread of farm electrification. It should also be borne in mind that, in many cases, the fact that these hamlets were within the area covered by an R.E.A. made the overall cost of joint service low enough to make it feasible for the farmers to build their lines. The farmers and the hamlet

customers are mutually dependent.

While there are 45,848 bona fide farmers connected, farm electrification also served 7,349 non-farm customers who would not have obtained service otherwise. The total number benefiting by the construction of these farm electrification lines is, therefore, 53,197.

TABLE NO. 19

ALBERTA POWER COMMISSION

Combined Figures for Alberta

Farm Electrification as at December 31, 1958

	<u>No. Farms Connected</u>	<u>Non-Farms</u>	<u>Hamlet Customers</u>	<u>Total Non-Farm Customers</u>	<u>Total Served Off Farm Lines</u>
Experimental Areas	3,091	594	461	1,055	4,146
Completed R.E.A.'s	40,621	2,469	3,825	6,294	46,915
Individual Rurals	1,917				1,917
Farms supplied by cities	219				219
Total Actually Served	45,848	3,063	4,286	7,349	53,197

UNDER CONSTRUCTION *

	<u>No. Farms Under Construction</u>	<u>Non-Farms</u>	<u>Hamlet Customers</u>	<u>Total Non-Farm Customers</u>	<u>Total Served off Farm Lines</u>
New Areas	144				144
Additions to old areas	1,169	10	10	20	1,189
Total under construction	1,313	10	10	20	1,333

* 'Under Construction' includes any farmers at any stage of construction from staking to energizing.

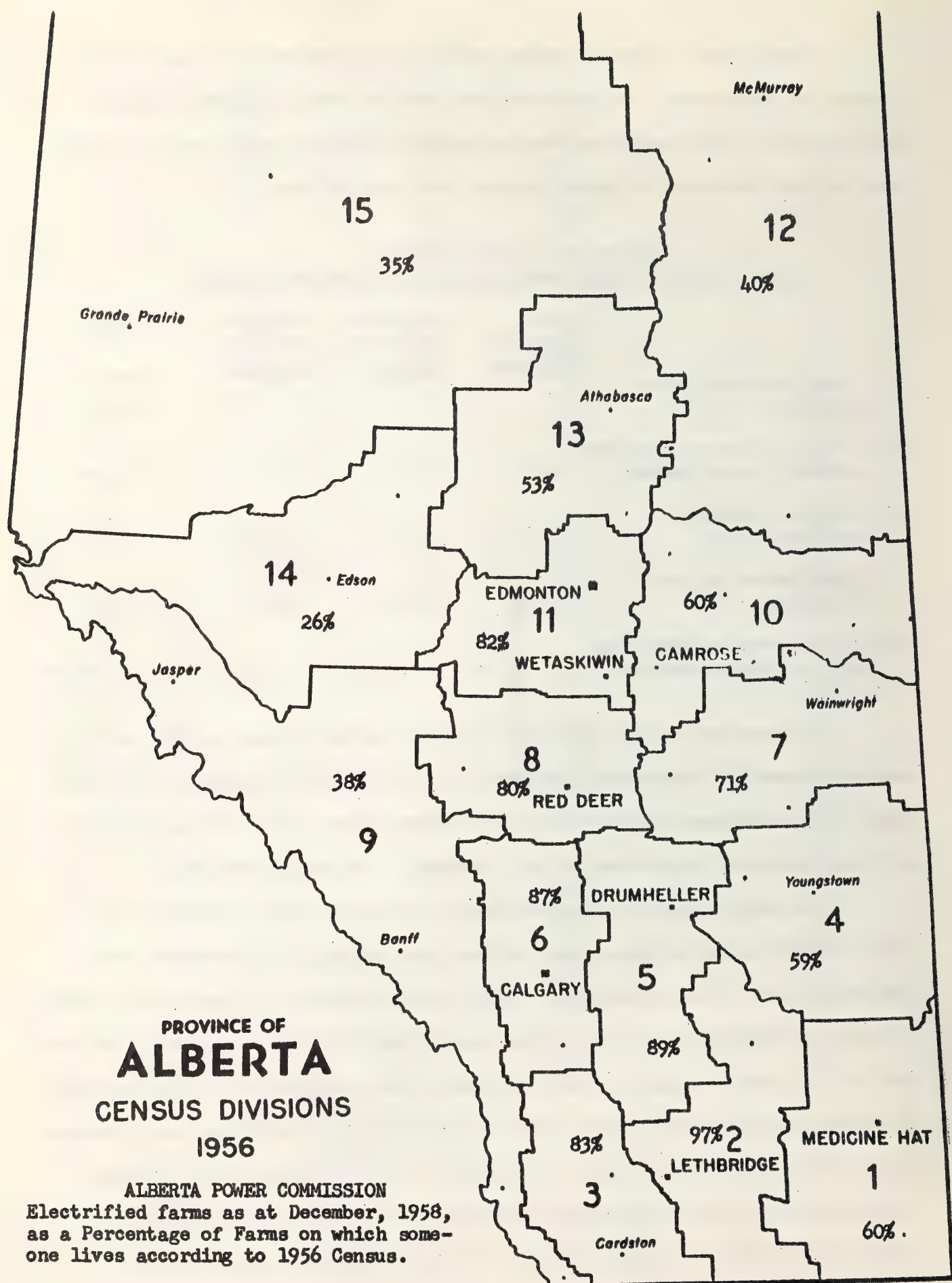
The figures in the following table show the progress of farm electrification in another way. In preparing the table we have zoned the Province into areas that could be served most economically by each power company and we have included the farms in these areas in our calculations.

Saturation in Areas Served by
the following three Companies only at December 31, 1958

	<u>Farm Electric Services</u>	<u>Canadian Utilities Limited</u>	<u>Northland Utilities Limited</u>	<u>Total</u>
(a) Total farm residences occupied				69,319
(b) Total of these within area served by each Company	42,212	20,638	5,110	67,960
(c) Probable ultimate saturation 85%	35,880	17,540	4,340	57,760
(d) Farms served by each Company	32,525	11,318	1,662	45,505
(e) Farms served by each Company as a percentage of (c)	90.6%	64.5%	38.3%	78.8%

In previous reports a detailed map was included which, as the years went by, showed the remarkable progress made in farm electrification. Now that these lines have been built into all the farming areas of the Province it does not seem necessary to continue it as a feature of the annual reports.

The map on Page 44 shows the Census Divisions in the Province as at 1956, and also shows the percentage of the farms in each Division which were electrified at the end of December, 1958. This percentage is based on the number of farms on which someone lived at the time of the 1956 Census. It will be noted that in the Special Areas, Census Divisions 1 and 4, saturation of farm electrification approached 60%. This is rather remarkable in view of the long distances between farms and of the amount of ranching area in this part of the Province. Throughout the richest agricultural portions of the Province the saturation of farm electrification is very high and it becomes less in Census Divisions 7, 10



and 13. Census Divisions 9, 12, 14 and 15 contain much of the fringe areas where agricultural income per farm is the least and where, therefore, we might expect to find a smaller percentage of the farms electrified. Even in these areas, however, a very complete framework of farm lines exists. It is these areas that have benefited most by the application of Part II of the Revolving Fund Act. The future increase in the number of farms electrified will be generally confined to these areas.

At the end of December, 1958, there were 35,352 miles of farm lines and during the year 3,791 miles had been constructed.

Financing

At the end of December there was a total of 364 active Rural Electrification Associations. These Associations have borrowed under both the Guarantee Act and the Revolving Fund Act and the total of these borrowings has been over \$31,000,000.00. At December 31, 1958, nearly \$15,000,000.00 of this had been paid back. The investment in all rural lines in the Province is approximately \$45,000,000.00.

The Rural Electrification Revolving Fund Act, has been of great assistance to all farmers who have been connected during the past four years. By the end of 1958 the Power Commission had given approval to 1,744 applications for loans under Part I of this Act. While all of this money had not been borrowed by the end of December, the approvals covered 25,027 farmers at an estimated cost of nearly \$29,500,000.00.

During 1958 the Power Commission gave approval to 421 applications for loans under Part I of the Revolving Fund Act for an amount of \$5,334,145.00, to give service to 4,072 farms. Of this amount \$4,225,280.00 was loaned where no Part II loan was necessary. Of the 4,072 farmers signing contracts under the Revolving Fund Act, 803 of them were in areas that needed the assistance of

Part II loans. In such areas Part I loans totalling \$1,108,865.00 were approved in conjunction with Part II loans totalling \$361,963.00. The framework of lines in these new Part II areas will make it possible for an additional 1,112 farmers to connect to them whenever they are ready. The following table shows the position of Part II loans at the end of December, 1958, and covers all loans from the beginning.

Standing of Part II Loans to December 31, 1958

Amount of Part I loans approved in conjunction with Part II loans since inception of Part II -	\$3,940,389.00
Amount of Part II loans as initially approved -	1,462,780.00
Cancelled because more farms hooked up after construction started and therefore the loan was not needed -	39,588.27
Total subject to call -	1,423,191.73
Drawn prior to Dec. 31, 1958 -	\$1,330,187.73
Refunded prior to Dec. 31, 1958 -	278,043.96
Total part of that actually drawn which is still outstanding -	1,052,143.77
Amount of money authorized but not yet drawn from Treasurer -	93,094.00
Total number of farmers in areas having Part II loans -	7,926
Number of farmers taking service initially -	3,050

During the period since the inception of Part II loans the Power Commission has approved Part II loans totalling \$1,462,780.00. In some cases construction of the lines for which these loans were approved has not been started and other cases has not advanced to the point where the money has to be

paid out. For this reason, of the total amount authorized, \$93,094.00 has not yet been disbursed. Of the total of \$1,330,187.73 which was disbursed, \$278,043.96 has already been paid back because of farmers who have hooked up to the lines which were made possible by these loans.

The existence of Part II loans has made it possible to build a framework of lines in areas which otherwise could not have obtained service. There were 7,926 farmers in these areas and initially 3,050 of them took advantage of this financial assistance to get their lines built. When the remainder of the farmers in these areas take service it will be possible to pay off the outstanding balance of the Part II loans. Part II loans have made it possible to extend lines to many areas of the Province which otherwise could not have had service. There are very few areas left now which do not have a network of lines and for this reason we do not expect very heavy demands for Part II loans from here on.

Checking Costs

During the year the Commission has checked all the cost statements which the companies send to R.E.A.'s showing the costs of building their lines, and at the Commission's request the Provincial Auditor has audited a sampling of cost statements. In addition to this, some field checks have been made on various farm areas. With very minor exceptions these costs have always been found to be correct. These checks further show that the areas have been constructed at cost. On the whole, then, we conclude that the Power Companies are building these areas at cost and that, from an engineering standpoint, they are building them efficiently.

The Power Commission feels that it is its duty, not only to investigate problems brought to it, but also to investigate any phases of farm electrification which it believes require study. While the building of farm lines appears very simple and the operation of them is taken for granted, nevertheless

there are many intricate problems to be considered if we are to keep all expenses down to the very minimum. Many questions such as monthly versus quarterly billing, card meter reading, operating charge per foot of line; accumulation, investment and use of deposit reserves all merit careful and continuous study. As each of these problems is solved a new one arises to take its place. In its engineering and accounting aspects farm electrification is highly technical and the individual farmer does not have the time nor the opportunity to investigate these matters. The Power Commission feels that one of its main responsibilities is to see that consideration is given to every factor that could possibly reduce the cost of electricity to the farmers. It tries to perform this service.

The question of the correctness of operating charges made to farmers is constantly under study. We believe that the Power Companies are doing a remarkable job of keeping these costs down and of accounting to the farmers for them. In most cases the actual costs are less than the monthly charges made to the farmer in his power bill, so that at the end of each year the Power Companies have been able to make a refund to the deposit reserves of the Associations. The operating charges made in Alberta appear to be reasonable and compare very favourably with those made by R.E.A.'s who are operating in similar territory in the United States. One of the advantages gained by the farmers which enables the operating charges to be kept low is the rather unique method of operating R.E.A.'s in Alberta. While in the United States the R.E.A.'s are generally larger than they are in Alberta, each R.E.A. maintains its own supervisory, office and operating staff, with the result that its overhead is apt to be high. In Alberta where the expenses of operating R.E.A. lines are pooled over all the farmers being served by any one power company, and where, for instance, Canadian Utilities Limited does the operating for some 11,000 farms, and Farm Electric Services does this work for some 32,000 farms, the overhead from a number of small offices is not added to operating expenses. In other words, these companies operate the

farm lines more efficiently than would be the case if they were being operated separately by a number of small R.E.A.'s. Unfortunately the utmost efficiency in operating these lines is not enough to keep pace with the inflationary rise in material and labour costs. Increases in cost are gradually narrowing the spread between the actual costs and the nominal operating charge.

The question of the adequacy of the deposit reserves being set aside is receiving study. Some of the older lines of the first R.E.A.'s are now approaching the midpoint of their useful life and studies are being undertaken to try to determine whether or not there will be sufficient money in their deposit reserves to rebuild these lines when the time comes that this has to be done. In general it appears that most deposit reserves will be adequate but there will undoubtedly be some R.E.A.'s in which, because of their high mileage of line per farm, it may be desirable to increase the annual accrual. These studies are being continued by the Power Commission, the Union of R.E.A.'s and the Power Companies, and it is hoped that in a year or so some definite recommendations can be made.

The annual use of electricity per farmer in the Province in 1958 has been 3,530 K.W.H. The K.W.H. used per farm per month is low when the farmer is first connected, but increases rapidly during the first year or so. For instance the consumption of the 4,718 farmers who were connected in 1958 will be low. This will have the effect of making an average figure for K.W.H. per farm per year seem lower than it would actually be if all farmers had been connected for a period of, say, three years. When, therefore, we use this figure of 3,530 K.W.H. per farm per year, we should realize that the average farm that has been connected for three years, will use more than this.

Nevertheless, when we consider this figure of 3,530 K.W.H. per farm per year, it is obvious that electricity has become a necessity in farming operations. It is most gratifying therefore to know that farm electrification is

now available to almost every Alberta farmer. Electricity provides more than comfort and convenience. It is the most useful tool a farmer can have. It is the one tool which, if used correctly, will repay its cost to the farmer many times over. Electricity is not a luxury. In this age it is an economic necessity. Without it life on the farm is drudgery and undesirable. With it farm life becomes miraculously changed. An electrified farm is an ideal place in which to live. Agriculture is one of our large industries. Everything should be done to make life on the farm as prosperous and as happy as possible. Electricity will be one of the biggest factors in bringing this about.

During 1958 the electricity consumed by farmers accounted for 6% of the total electricity sold in the Province. While farmers use only 6% of the K.W.H. they are responsible for about 14% of the peak load. Even when we get all the farms electrified the percentage which the farmers will use of the K.W.H. generated in the Province will not be large. It is not likely to exceed 6% of the total output.

Since the farmers were responsible for about 14% of the peak load in the Province it means that 14% of the total capacity of the power plants and the transmission lines, or about 80,000 K.W., was reserved for their use. This 80,000 K.W. is a large proportion of total plant capacity and consequently means that a large proportion of the companies' investment in plants and transmission lines is reserved solely for farmers. The companies' investment in this equipment which is reserved solely for the farmers' use will be well over \$600.00 for each farm served.

The average farmer's electric load factor is very low and is something of the order of 27% as compared to a Province-wide load factor of about 50%. This question of load factor is an important one and while it confronts many industries, it bears most heavily on the gas and electric utilities. The highest electrical peak load of the year usually happens just before Christmas and

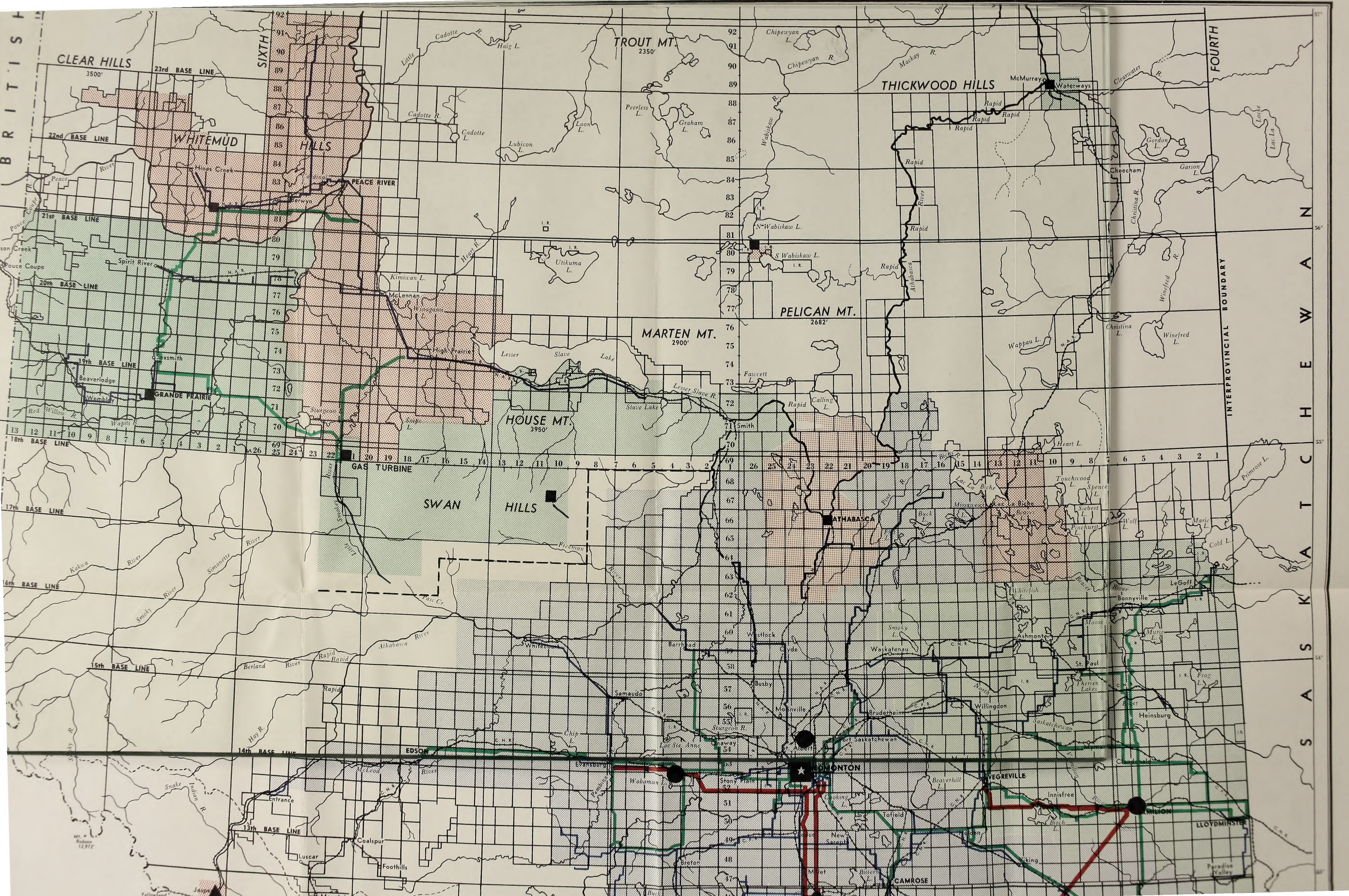
may have a total duration of only an hour or so on two or three different days at that time of year. The power companies have to install enough generating capacity to meet that peak even though for the remainder of the year all of this capacity is not used.

Once the generating capacity is installed, and this is particularly so of hydro plants, the cost of operating it 24 hours a day is not such a great deal more than the cost of operating it one hour a day. In other words, the cost of generating 24 K.W.H. per day with 1 K.W. of equipment, is not much more than generating 1 K.W.H. per day with 1 K.W. of equipment. This being the case, any customer such as a paper mill in the East, for instance, who can use a fairly constant amount of power for 24 hours a day for 365 days a year, can obtain this power very cheaply. Such a customer has a load factor of nearly 100%. An example of a customer at the other end of the scale would be a community hall used for only a few nights during the winter and therefore having a load factor of possibly 1%. The average load factor placed upon the plants in Alberta is about 50%, - that is, on the average the generators produce only one-half of what they could if the load was such that they could run steadily for 24 hours a day.

The 45,848 farms in the Province fall far below this average of 50% and have an actual load factor of about 27%. Some 80,000 K.W. of generating equipment has to be reserved solely for their use over the peak load period but for the year as a whole it is only used 27% as much as it could be. A rough calculation indicates that if farmers could improve their load factor to, say, 37%, then the cost per K.W.H. of the power supplied to them would be reduced about 25%.

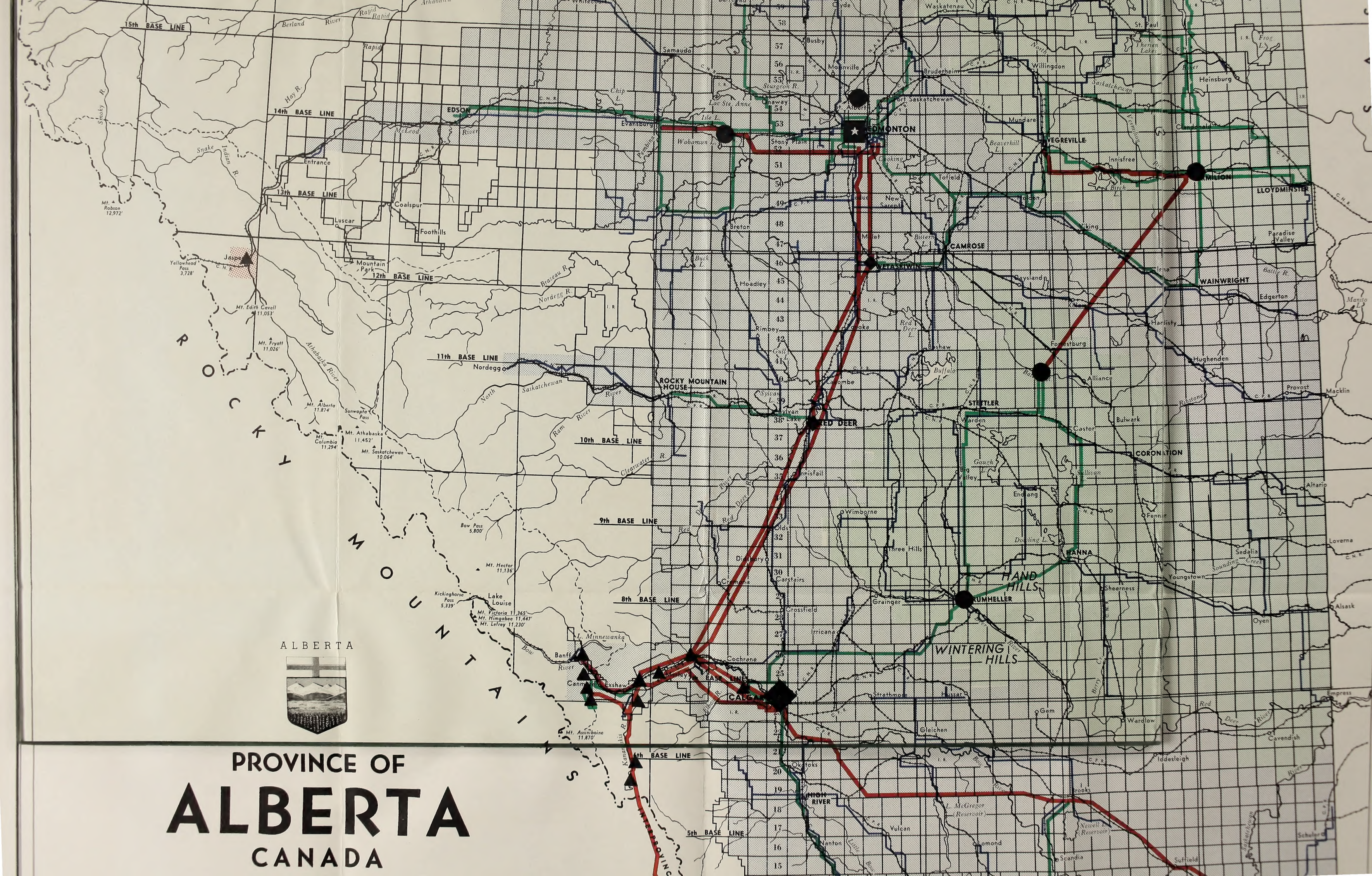
In order to improve their load factor farmers would not only have to use more electricity than they do now but would have to arrange their farming operations so as to use the extra power at an off-peak period. While it is

probably not possible to make major changes in farming practice in the use of electricity nevertheless this does present an avenue which would lead to reduced power bills so long as all farmers were to work towards that end. It is a subject toward which farmers might direct some thought in the hope of improving their load factor although in practice the cost of electricity is such a small part of the total operating cost of a farm that any savings effected in this manner would be very small.



PROVINCE OF
ALBERTA
CANADA

ALBERTA



ALBERTA



PROVINCE OF ALBERTA CANADA

ALBERTA POWER COMMISSION
MAP OF
TRANSMISSION LINES
IN
PROVINCE OF ALBERTA

1920 Scale: 1 Inch = 20 Miles 58

LEGEND

TRANSMISSION LINES 132 K.V. & OVER
" " 33 K.V. TO 72 K.V.
" " UNDER 33 K.V.
POWER PLANTS - STEAM
- HYDRO
- INTERNAL COMBUSTION

SERVICE AREA
CALGARY POWER

CANADIAN UTILITIES

NORTHLAND UTILITIES

